Taikichiro Mori Memorial Research Fund

Graduate Student Researcher Development Grand

Research Report for Academic Year 2021

Research Project	A Blockchain-based Environment Monitoring System
Researcher	Cheng Yiyang
Affiliation	Graduate School of Media and Governance
No.	43
Result of this project Research (Publication)	Cheng Yiyang, Kazunori Takashio, "A Feasibility Study of An Intelligent Environmental Monitoring System Based On The Ethereum Blockchains", The 12th International Conference on ICT Convergence(ICTC) 2021
Research Overview	In today's era, the security and authenticity of information have always received extensive attention, especially when people have doubts about the authenticity of data. Hence, a traceable data storage platform with the feature that theoretically cannot be tampered with becomes extremely important. Under such demands, the deployment of smart contracts can effectively trace the source and discover problems. This project proposed an environmental data detection platform based on blockchain technology and smart contracts. It aims to record the data continuously and verify the authority of each transaction. We surveyed the reputation of foods produced in Fukushima, and we invited 41 people to answer these questions. Based on the result, we can understand that transparency is the main problem. Also, we can speculate that allowing a third-party organization trusted by the public to join the testing network and release data through this organization can effectively improve reliability from the people, especially foreigners who do not believe the data from Fukushima Prefecture. In response, this project proposes an environmental monitoring platform. The system can continuously monitor environmental data, and retrieve historical data at any time. Additionally, it can identify the authority of users. Meanwhile, a third party can join at any time when needed. We implemented this platform at SFC in July. Specifically, in every five seconds' data transmission, no data is missed, and no transaction-uploading to the chain failed. Benefit by the design and deployment of the smart contract, the blockchain system could review the address of each uploaded data and judge the validity. From the perspective of security, the security level of our work is better than other similar works because we are checking the validities at each time and will reject the invalid users. The query system can also distribute the invoice of each valid transaction to other nodes for quick queries through the broadcast of the UDP network. At the same time, by introducing new nodes

	during the procedure, we confirmed the possibility of introducing a new node to the networks. Through counting the total number of blocks, we could know that even a node that joins in the middle, will not lose any data and can still effectively query the blockchain data. In summary, Benefits by our methodology, the security of the system has been comprehensively improved. Simultaneously, by building a supporting system, we make data queries more convenient.
Future work	Integrate the UAV (Unmanned Aerial Vehicle) to this network. Actual deploy to Fukushima prefecture.